



# Carbon Neutrality, Renewable Energy Certificates & Carbon Offsets

System Sustainability Summit  
December, 4 2018

# Carbon Neutrality



*Modified from Presentation at AASHE Conference 2018: Approaches to Carbon Offset Procurement, Ruby Woodside, Second Nature*

## Second Nature Guidance:

All Scope 1 and Scope 2 emissions, as well as those Scope 3 emissions from air travel paid for by or through the institution and regular commuting to and from campus, must be neutralized.

Energy efficiency/  
Conservation

### Scope 1

On Campus Combustion/  
Fuel Use, Fugitive  
Emissions, Agriculture

Fuel switching  
/Scaled  
renewables

### Scope 2

Purchased  
Electricity & Steam

Carbon  
offsets

### Scope 3

Travel & Commuting

Solid Waste Disposal is also included  
in UMD's Climate Action Plan

# Timeline

- **2014** – President announced new Energy Initiatives to tackle energy consumption in campus buildings (and approved the use purchase of verified offsets to support carbon neutral new construction)
- **2015** – University Sustainability Council held Carbon Offset Work Group including major air travel stakeholders to study options and make recommendations
- **2016** – University Sustainability Council approved recommendations to offset 100% of air travel
- **2017** – Vice President of Finance and Administration convened business officers to develop financial implementation plan; University Senate and Administrative Council approved the plan
- **2017** – Vice President of Finance and Administration announced Carbon Neutral Air Travel Initiative
- **2017** – Administrative Council (university leadership) approved assessment of surcharge to offset all air travel for CY 2017
- **2018** – Bursar collected carbon surcharge at the divisional level for CY 2017 air travel
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# ClimateAction



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Carbon Neutral New Construction



Energy Conservation Measures for 20% Reduction in Electricity by 2020



Behavior Change



Verified Carbon Offsets



100% Renewable Purchased Power by 2020



# Allowances & RECs vs. Offsets

## Allowances

- Represents the allowed emission of one Metric Ton of carbon dioxide equivalent (t-CO<sub>2</sub>e or MT-CO<sub>2</sub>e)

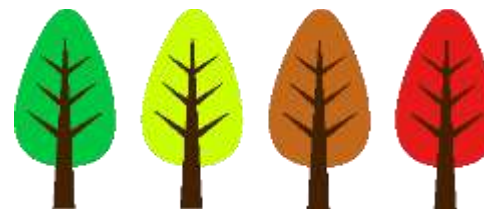


## Renewable Energy Certificates (RECs)

- Represents the addition of renewable electricity added to the grid, can be applied to 1 MWh
- Not necessarily associated with an emissions reduction, electricity emissions are displaced to the grid

## Offsets

- Offsets represent the reduction of emissions elsewhere, measured in t-CO<sub>2</sub>e
- Offsets can be purchased and retired to lower an entity's overall emissions, and within scope 1, 2 or 3



*Modified from presentation at AASHE Conference 2018: Mitigating Emissions from Air Travel: Measuring, Pricing and Collaboration, Tani Colbert-Sangree, Duke Carbon Offsets Initiative*

What is a

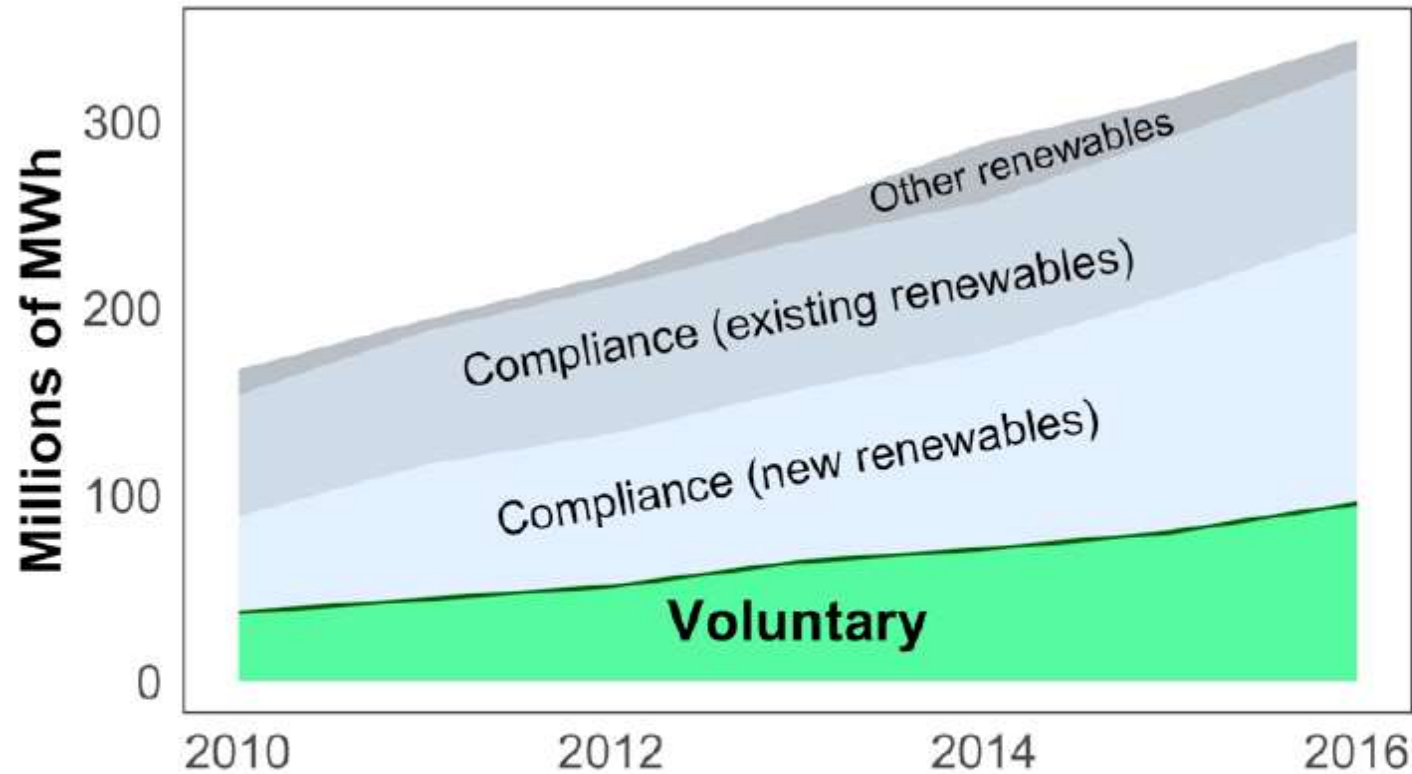
# Renewable Energy Certificate?



CRS

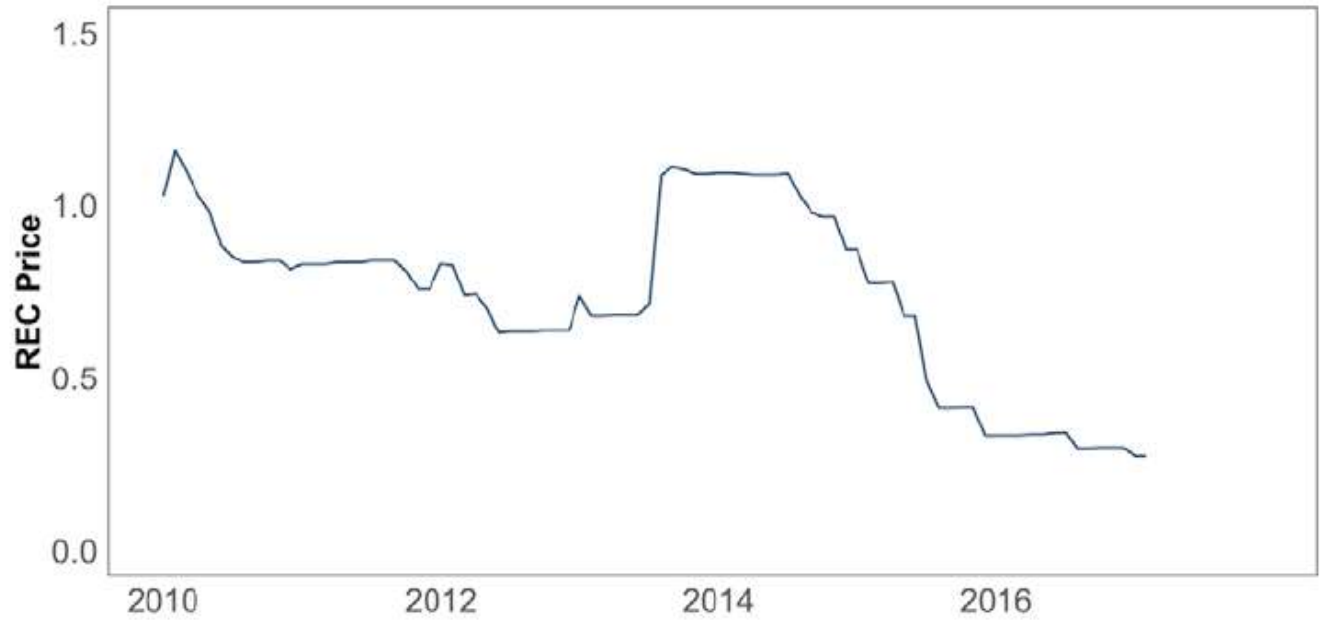
center for  
resource  
solutions

# Voluntary Commitments and Regulatory Standards Drive REC Demand



**Figure 5. Renewable energy sales in voluntary, compliance, and other markets from 2010 to 2016**

The figure is based on data from EIA 2017 and LBNL 2017.



**Figure 19. Voluntary national REC prices**  
Sources: SNL Energy 2017, Marex Spectron 2016

**In 2016, voluntary RECs were on average less than \$1 per ton of carbon neutrality claimed**

Graphs from NREL Report: Status and Trends in the US Voluntary Green Power Market (2016 Data). <https://www.nrel.gov/docs/fy18osti/70174.pdf> and 2018 Q3 State of the Market Report for PJM, [http://www.monitoringanalytics.com/reports/PJM\\_State\\_of\\_the\\_Market/2018.shtml](http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2018.shtml)

## Select Renewable Portfolio Standards Compliance REC Prices

Figure 8-3 Average Tier I REC price by jurisdiction: January 2009 through September 2018

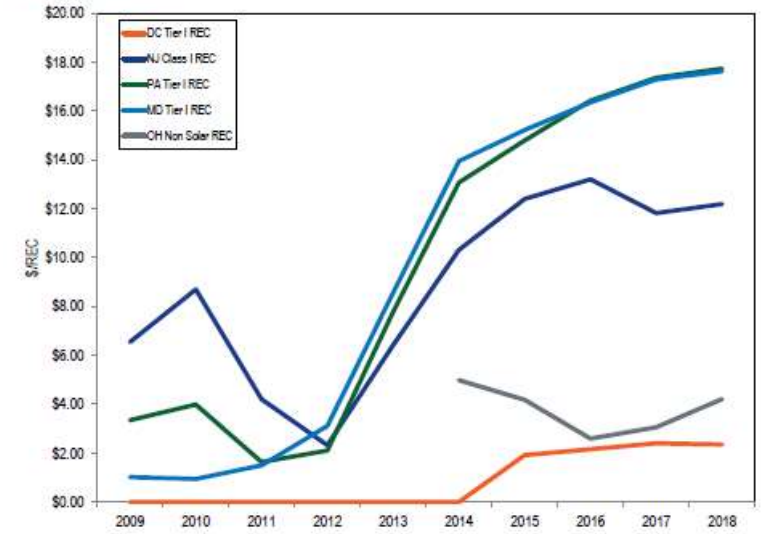
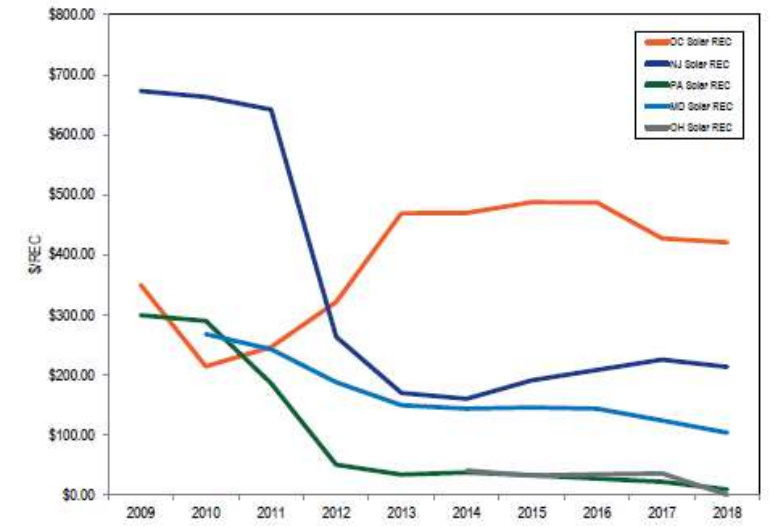
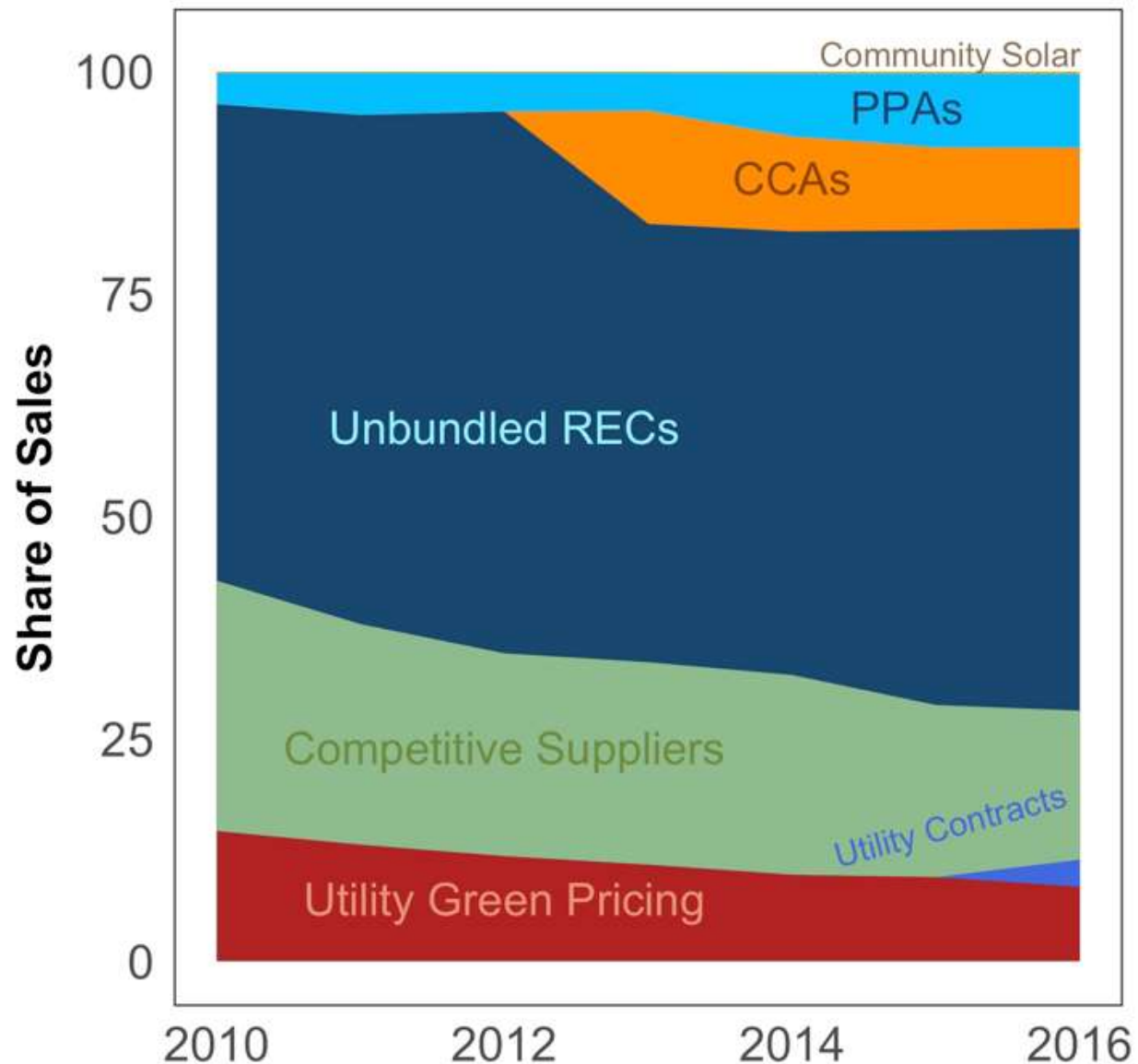


Figure 8-7 Average SREC price by jurisdiction: January 2009 through September 2018





# There are a number of ways to structure renewable power procurement...



- Carbon neutral power can only be claimed by an institution if it retains corresponding RECs.
- 1 REC per MWh must be retired (if listed on a registry) or retained if generated on-site and never listed on a registry.
- RECs eligible for the compliance market can be swapped for voluntary RECs if regulatory compliance is not an issue.

# Carbon Offset Projects



**Carbon offsets can be used to reduce net greenhouse gas emissions.**



Urban Forestry



Peatland Restoration



Avoided Deforestation



Waste to Energy



Energy Efficiency



Clean Cookstoves



Ozone Depleting Substance Destruction

# What are carbon offsets?

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- Renewable Energy
- Avoided Deforestation or Reforestation
- Fuel Switching
- Energy Efficiency
- Waste to Energy
- & more!

**P**ermanent – The reduction must last in perpetuity

**A**dditional – The reduction would not have occurred in a business-as-usual scenario

**V**erifiable – The reduction must be able to be verified with data

**E**nforceable – The reduction must be counted only once and then retired

**R**eal – The reduction must not be due to false accounting methodology

# Types of Carbon Offsets

Least Robust/ Most Flexible Requirements



## Innovative Offsets

- Apply to Scope 3 only, can offset up to 10% of total emissions



## Peer Reviewed Offsets

- Apply to Scope 3 only, can offset up to 30% of total emissions



Most Robust/ Strictest Requirements



## Traditional Offsets

- Can apply to any Scope and are marketable

# Voluntary Carbon Market

## GHG Standard Programs



- Protocols & Methodologies
- Set rules & requirements, processes

## Registries



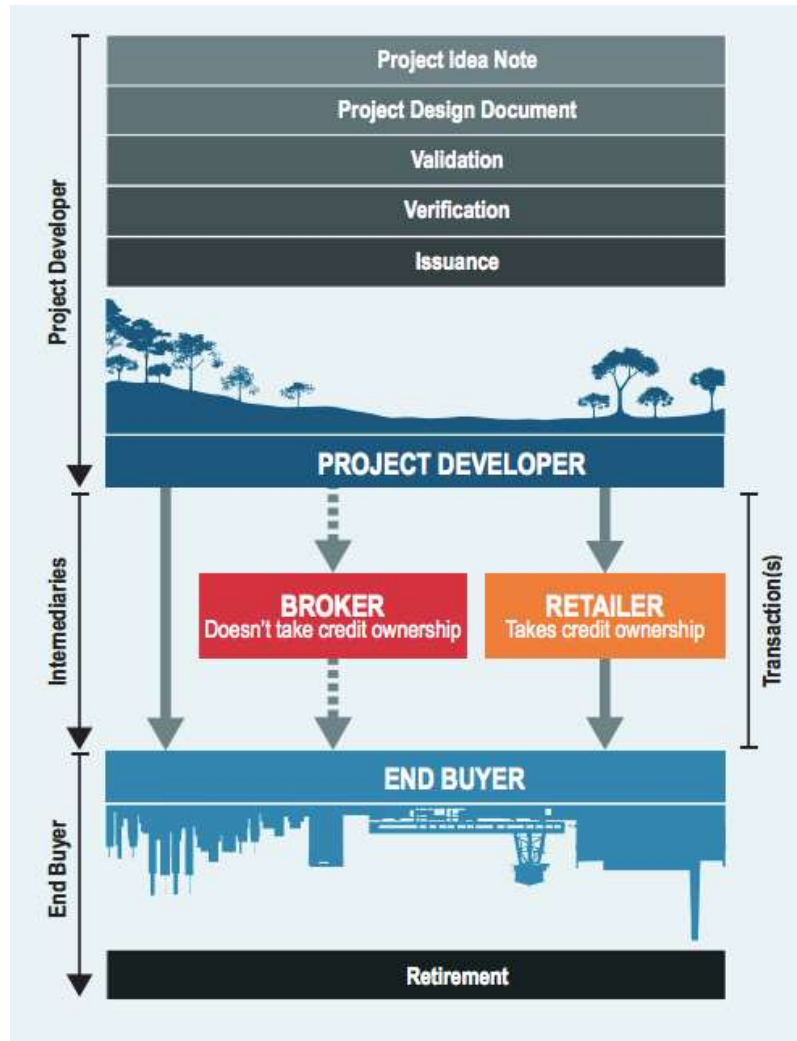
- Track credits
- Assure no double counting

## Validation and Verification Bodies



- Perform 3rd party validation of projects, methodologies
- Verify carbon reduction claims

# Voluntary Carbon Market



Colleges & Universities



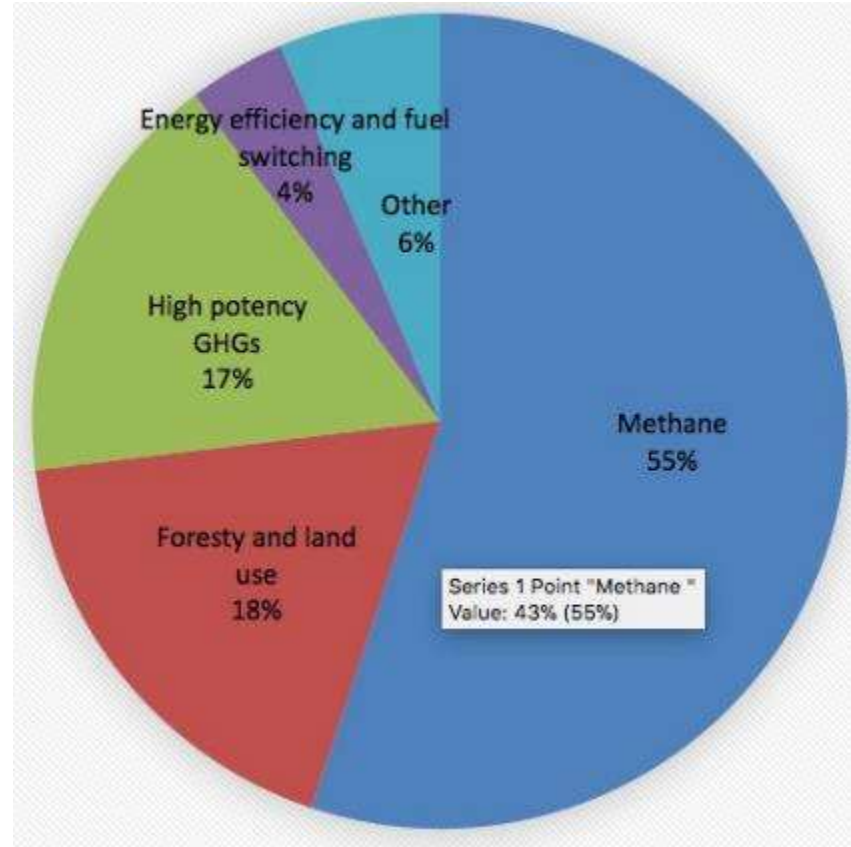
from Presentation at AASHE Conference 2018: Approaches to Carbon Offset Procurement, Ruby Woodside, Second Nature  
Figure from Ecosystem Marketplace, State of the Voluntary Carbon Market, 2017  
[https://www.forest-trends.org/wp-content/uploads/2017/07/doc\\_5591.pdf](https://www.forest-trends.org/wp-content/uploads/2017/07/doc_5591.pdf)

# Voluntary Carbon Market

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	Average size in tCO <sub>2</sub> e/year
All projects	208,692
Forest projects	789,467
Livestock digesters	14,485
Carbon capture and storage	741,271
Landfill gas	44,693

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Offset credits sold in the United States in 2016 by volume (excluding transportation)

*from Presentation at AASHE Conference 2018: Approaches to Carbon Offset Procurement, Ruby Woodside, Second Nature*

Data from Ecosystem Marketplace, State of the Voluntary Carbon Market, 2017, Regional Analysis

[https://www.forest-trends.org/wp-content/uploads/2017/11/doc\\_5664.pdf](https://www.forest-trends.org/wp-content/uploads/2017/11/doc_5664.pdf)

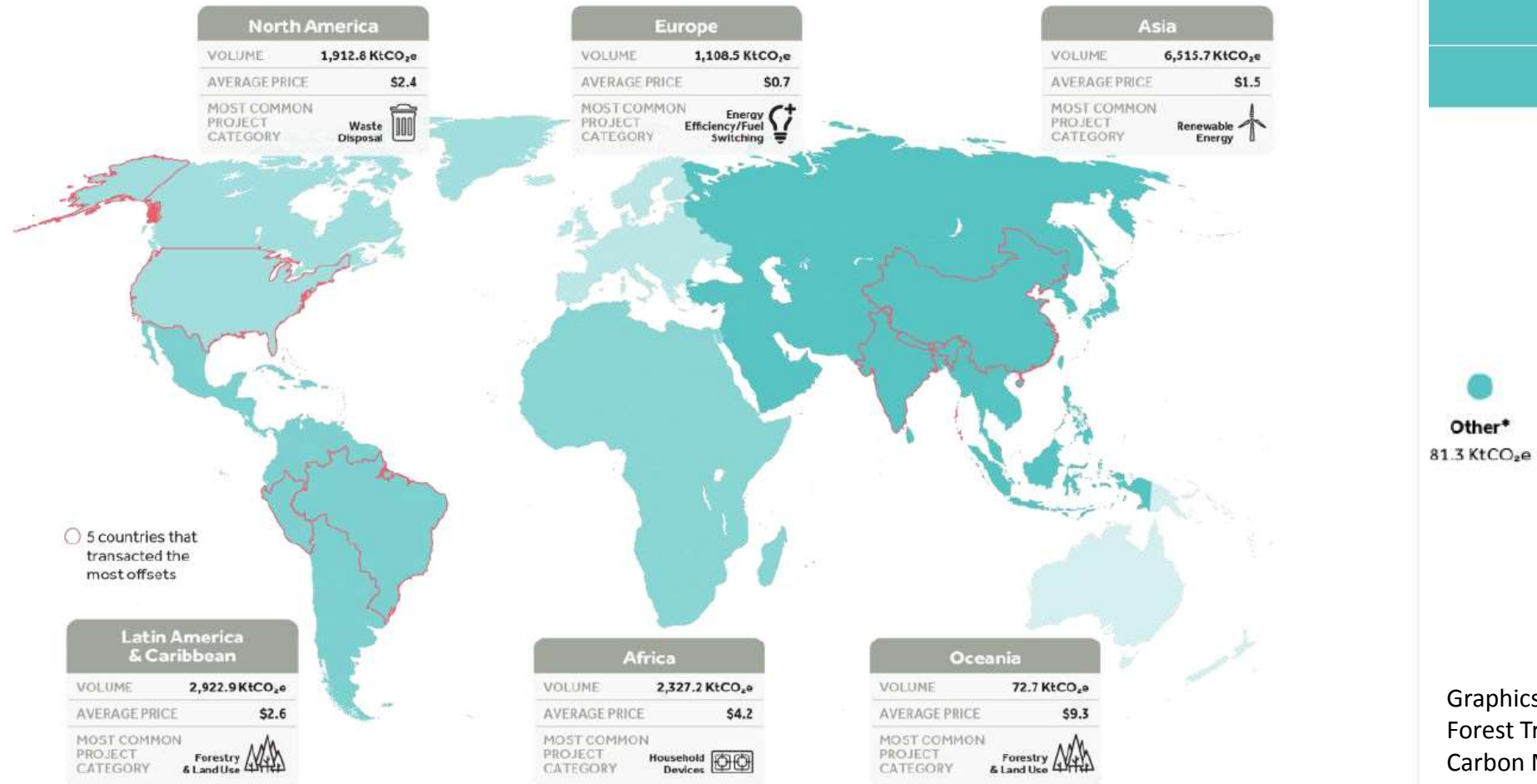
# Traditional Voluntary Offsets Sold- 1<sup>st</sup> Quarter of 2018

18

## By Region

Price of

Ag  
54.



\* Other includes transportation and other project types.

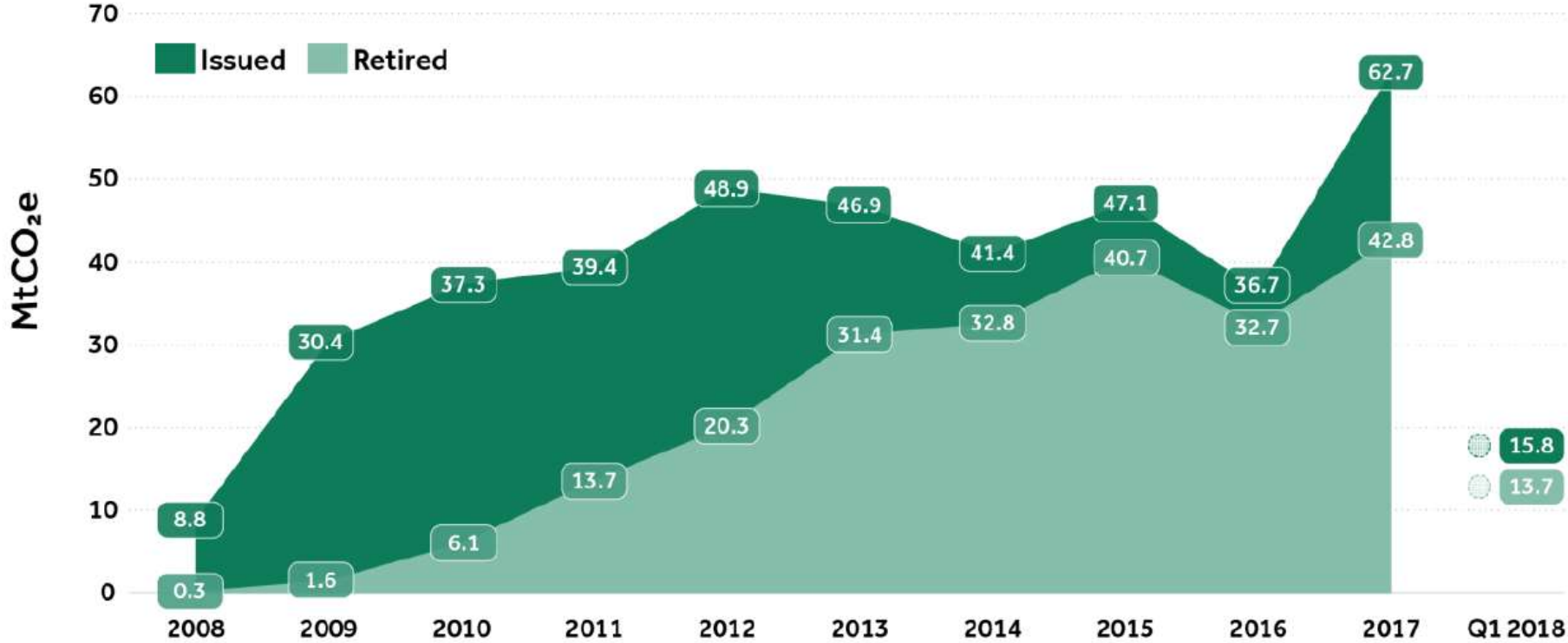
Notes: Data is based on results from Ecosystem Marketplace's survey of project developers, retailers, and brokers conducted in Spring 2018. See the methodology for more information. Based on 18.7 MtCO<sub>2</sub>e offsets transacted. Some category totals do not add up to 18.7 MtCO<sub>2</sub>e due to rounding conventions and/or incomplete offset attribute information.

Graphics and data from Forest Trends' Voluntary Carbon Market Insights: 2018 Outlook and First Quarter Trends, <https://www.forest-trends.org/publications/voluntary-carbon-markets/>



**In 2017 both Issuances (new supply) and Retirements (showing demand) both reached record highs, possibly due to growing voluntary commitments driven by The Paris Agreement.**

Figure 2. Historical Voluntary Carbon Offset Issuances and Retirements



Notes: Data is based on project registries from the following carbon standards: American Carbon Registry (ACR), Climate Action Reserve (CAR), Gold Standard, Plan Vivo, and Verra's Verified Carbon Standard (VCS) as of April 2018. Based on 401.5 MtCO<sub>2</sub>e offsets issued and 212.4 MtCO<sub>2</sub>e offsets retired between 2008 and 2017. Although there was some pre-2008 market activity, it is not included in this figure due to a lack of consistent, publicly-available information.



# Project Co-Benefits

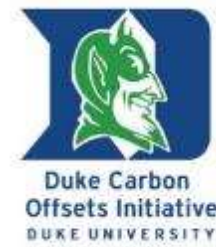


## *Co-Benefit*

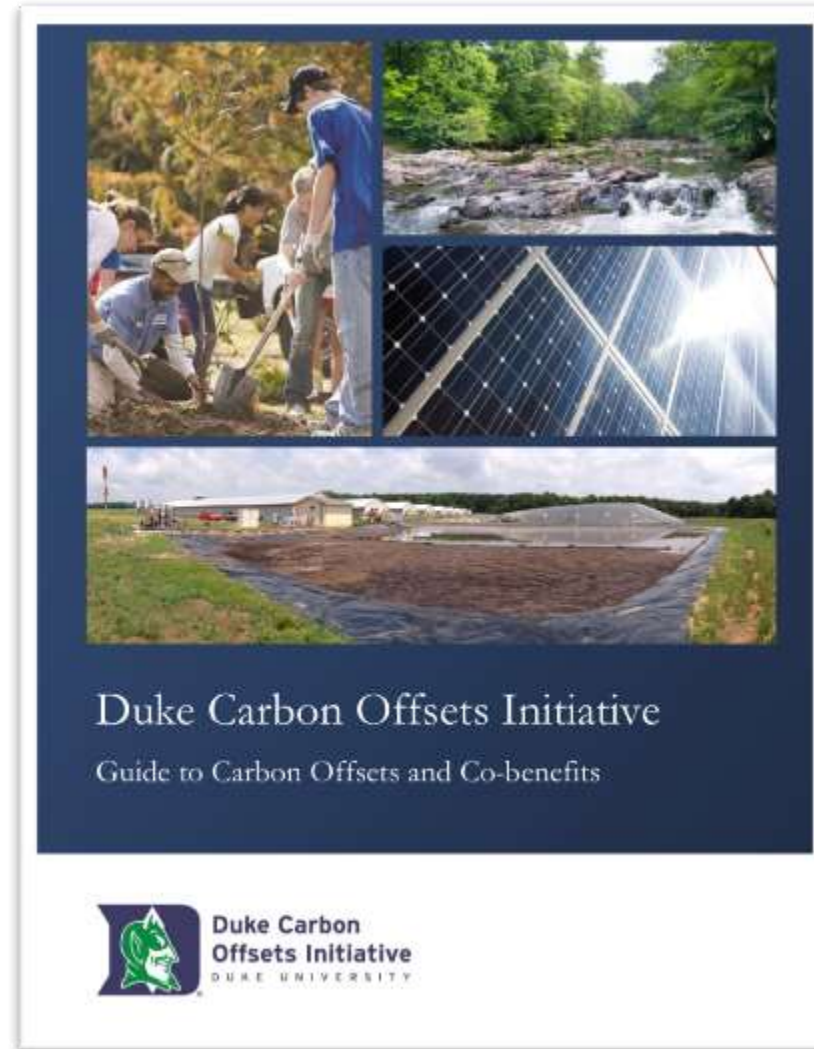
*Any benefit conferred by a project that is not the reduction, removal, or sequestration of GHGs*

- Co-benefits are a very important project characteristic
- They can help you compare projects and offset purchasing opportunities

# Co-Benefits Guide



- Educational opportunities for students, staff, and faculty
- Social engagement with local community members and organizations
- Environmental benefits for land, air, and water quality
- Scale projects up to increase the impact
- Public relations benefits and partnership building




# Offset RFP Template Example



- Standard form that offset solicitors must provide
- Includes basic information such as project type, price per offset, and offset registry
- Give structure and allows for apples-to-apples comparison of offsets on offer

Example Request for Proposal	
<b>Loyd Ray Farms Swine Waste-To-Energy</b>	
April 10, 2015	
Company Name: Duke Carbon Offsets Initiative	Point of Contact
Address: Duke University, 205 Allen Building, Box 90027 Durham, NC 27708	Name: Charles Adair Email: Charles.Adair@duke.edu Phone: 919.613.7466
<b>Brief Project Description (No more than 300 words):</b> Loyd Ray Farms (LRF) is a feeder-to-finish swine operation located in Yadkinville, North Carolina. Traditional waste management systems on swine farms utilize open-air lagoons to store waste. These lagoons produce methane emissions and odor that enter the atmosphere. To reduce these greenhouse gas emissions, generate renewable energy and carbon offsets, and minimize the overall environmental impact of the swine farm, an innovative waste management system was installed at the farm.  System construction began in 2010 and the system came online in 2011. The waste management system includes an anaerobic digester for biogas production, a microturbine for electricity generation, and an aeration basin for further COD reduction and partial nitrification/denitrification prior to recycling of the water for barn flushing. The system includes various recycle lines to maximize energy production and treatment efficiency. The system is designed in a way to keep operations simple and maintenance at a minimum. There are no complex controls and, with the exception of the microturbine, the system uses mostly off-the-shelf equipment already familiar to farmers. Notably, the parties responsible for development of the system have declared patent protection in order to facilitate development of similar systems.	<b>Offset Information</b> Offset Type: Waste-to-energy \$/Offset: \$50 Potential # of Offsets: 4,000 per year Offset Registry: CAR
<b>Total Cost of Purchase &amp; Staff Time</b>	
*For Internal Use Only	
<b>Minimum Criteria</b>	
_____ PAVER	
_____ Educational Opportunities	
_____ PR and Partnerships	
*For Internal Use Only	



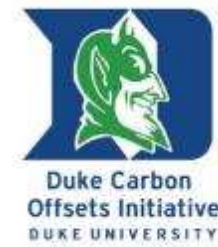
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## SUMMARY OF POTENTIAL OFFSET PROJECTS

Modified from Presentation at AASHE Conference 2018, Approaches to Carbon Offset Procurement, John Pumillio, Director of Sustainability, Colgate University

	Scope 1	Pros	Cons
	<p><b>Colgate Forest Carbon Project</b></p> <p><b>Carbon Offsets:</b> 9,000 tons annually for 9 years (81,000 total)</p> <p><b>Initial Cost:</b> \$240,000 - \$330,000</p> <p><b>Ongoing Cost:</b> \$30,000-\$35,000 every 5 years</p> <p><b>Cost per Ton:</b> \$3-\$4</p>	<ul style="list-style-type: none"> <li>-An opportunity for low-cost, high-quality, local offsets through an established registry</li> <li>-Could serve as a powerful educational and research experience for students and faculty</li> <li>-Elevate the important role of forest carbon in overcoming climate change</li> <li>-Result in a better managed, higher-value Colgate forest</li> <li>-Provide further incentive to reduce the likelihood of future land conversion</li> <li>-Further establish Colgate as an innovative leader in campus sustainability solutions</li> </ul>	<ul style="list-style-type: none"> <li>-High development and startup costs could cause sticker shock</li> <li>-Colgate would need to invest significant time and human resources into project development and analysis (more than simply purchasing offsets off the open market)</li> <li>-Project might not develop in time for offsets to be available for initial carbon neutrality date in 2019</li> </ul>
	<p><b>Patagonia Sur Forest Carbon Offset Project</b></p> <p><b>Carbon Offsets:</b> 5,000 tons annually until 2026</p> <p><b>Initial Cost:</b> \$0</p> <p><b>Annual Cost:</b> \$50,000</p> <p><b>Cost per Ton:</b> \$10</p>	<ul style="list-style-type: none"> <li>-An established project meeting the highest offset standards through the Verified Carbon Standard (VCS)</li> <li>-The VCS certified reforestation project coupled with the additional investment in CERs under the -COM means Colgate can be very confident it's making a solid investment in mitigating the impacts of global climate change</li> <li>-Ecological and social co-benefits associated with reforestation of native trees in a severely degraded ecosystem</li> <li>-Opportunities for continued educational and research experiences for students and faculty in a part of the world where Colgate currently does not have a lot of other established programs</li> <li>-Elevate the important role of forest carbon in overcoming climate change</li> </ul>	<ul style="list-style-type: none"> <li>-Perception that Colgate is part of a land grabbing scheme and owns land in Patagonia</li> <li>-Might be an opportunity to invest in alternative third-party certified offsets at a lower cost</li> <li>-Geographic distance makes it difficult for many at Colgate to have a direct connection with the project</li> </ul>
	<p><b>Purchasing Third-Party Verified Offsets</b></p> <p><b>Carbon Offsets:</b> up to 14,000 tons annually</p> <p><b>Initial Cost:</b> \$0</p> <p><b>Annual Cost:</b> up to \$140,000</p> <p><b>Cost per Ton:</b> \$6-\$10</p>	<ul style="list-style-type: none"> <li>-Reasonably priced, high-quality certified offset projects are readily available for investment</li> <li>- Decisions can be made on short-notice with no long-term commitments or contracts necessary</li> <li>--Avoid risks, time, and costs associated with developing a new project</li> </ul>	<ul style="list-style-type: none"> <li>-Can sacrifice educational, social, environmental, and local benefits when purchasing off-the-shelf carbon offsets</li> <li>-If not done carefully, may result in little community engagement or change in practices by the university</li> <li>-Perception of buying our way out of the problem</li> </ul>

# Carbon Offset Bundling



## Offset Bundling



### Immediate Benefits

- Reduction of institution's climate footprint
- Support worthwhile project
- PR benefits for your organization



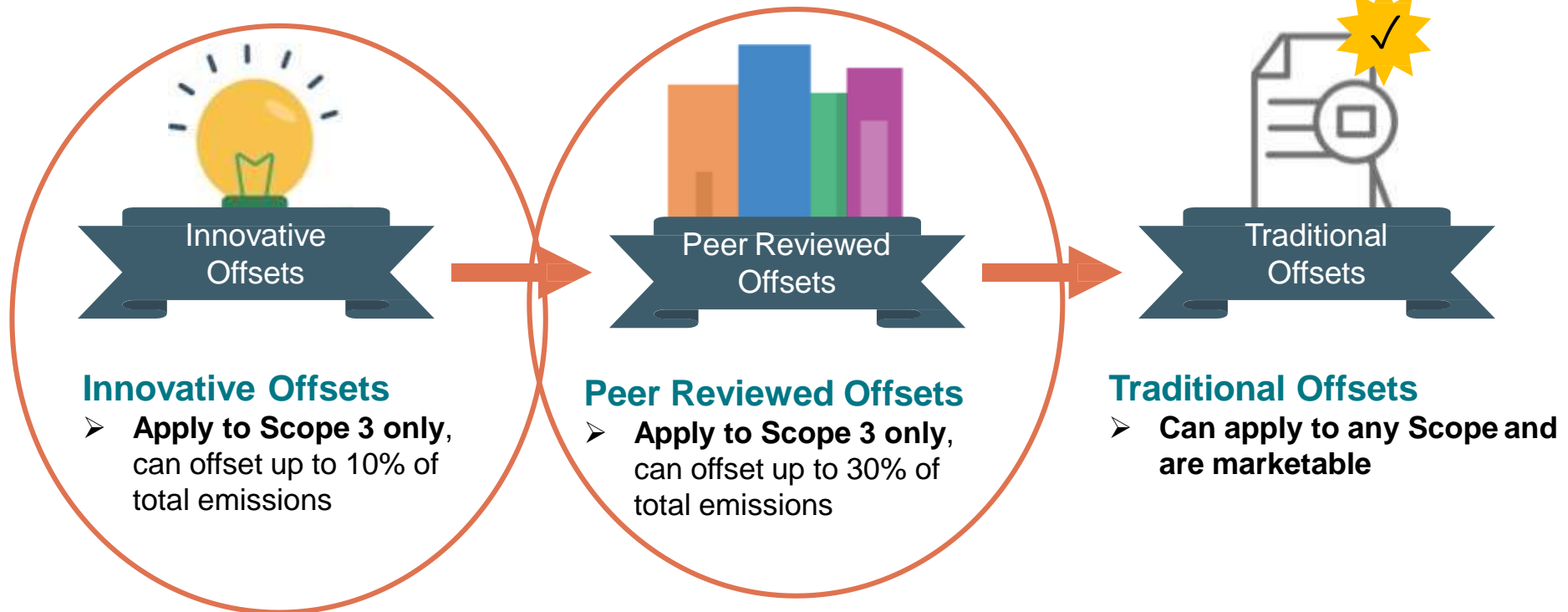
### Long-Term Benefits

- Future carbon offsets as trees grow
- Climate adaptation benefits provided by trees
- Trees as educational tools

# Types of Carbon Offsets

Least Robust/ Most Flexible Requirements

Most Robust/ Strictest Requirements

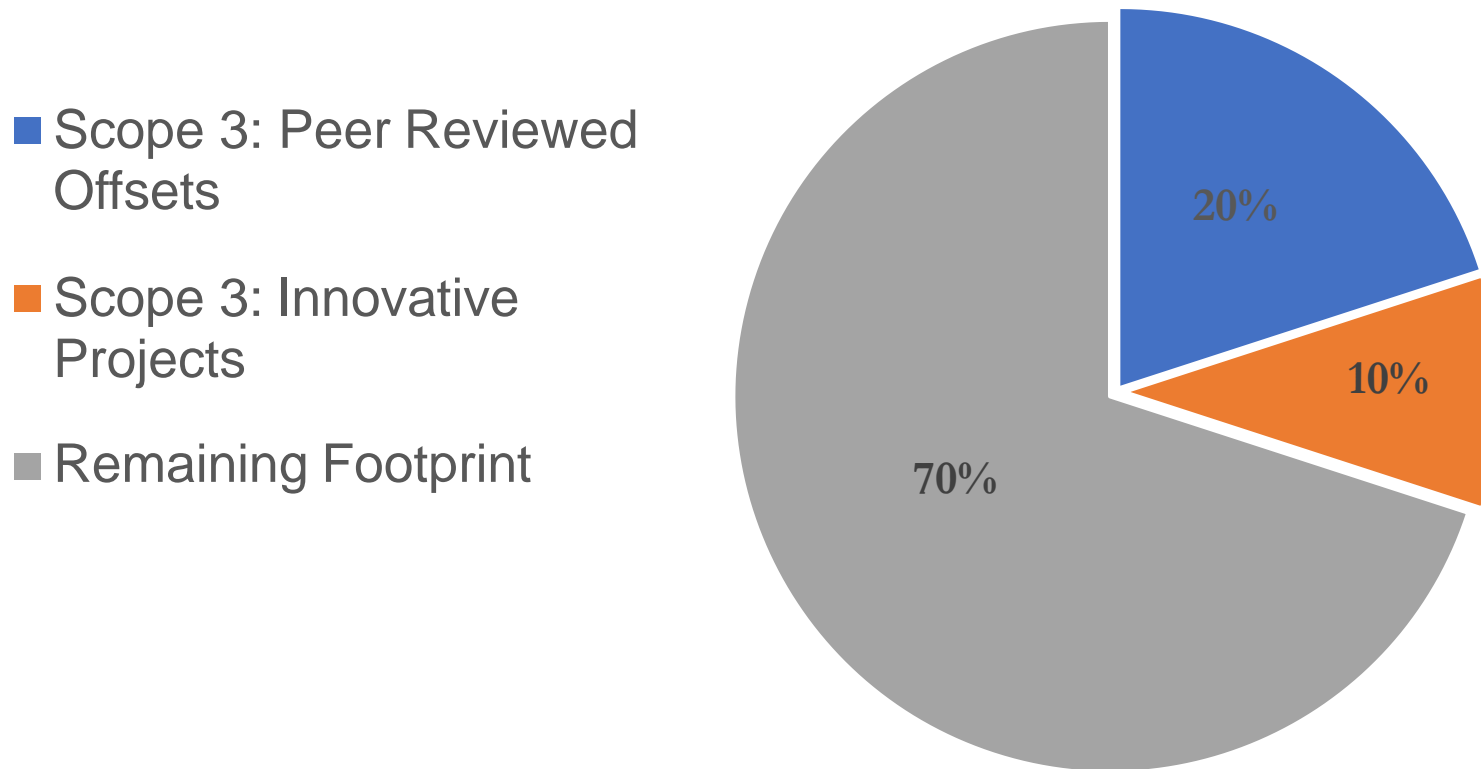




# Carbon Markets & Offsets Guidance

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## Campus Emissions Inventory



# What are Peer Reviewed & Innovative Offsets?

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- Carbon offset projects developed internally by the college or university that have not gone through traditional third-party validation & verification
- Peer reviewed and innovative offsets are **NOT** marketable

## Peer Reviewed Offsets

vs.

## Innovative Offsets

Must meet all PAVER requirements

May use an existing protocol, or develop a new protocol

May be verified by a peer institution (rather than an accredited third-party auditor)

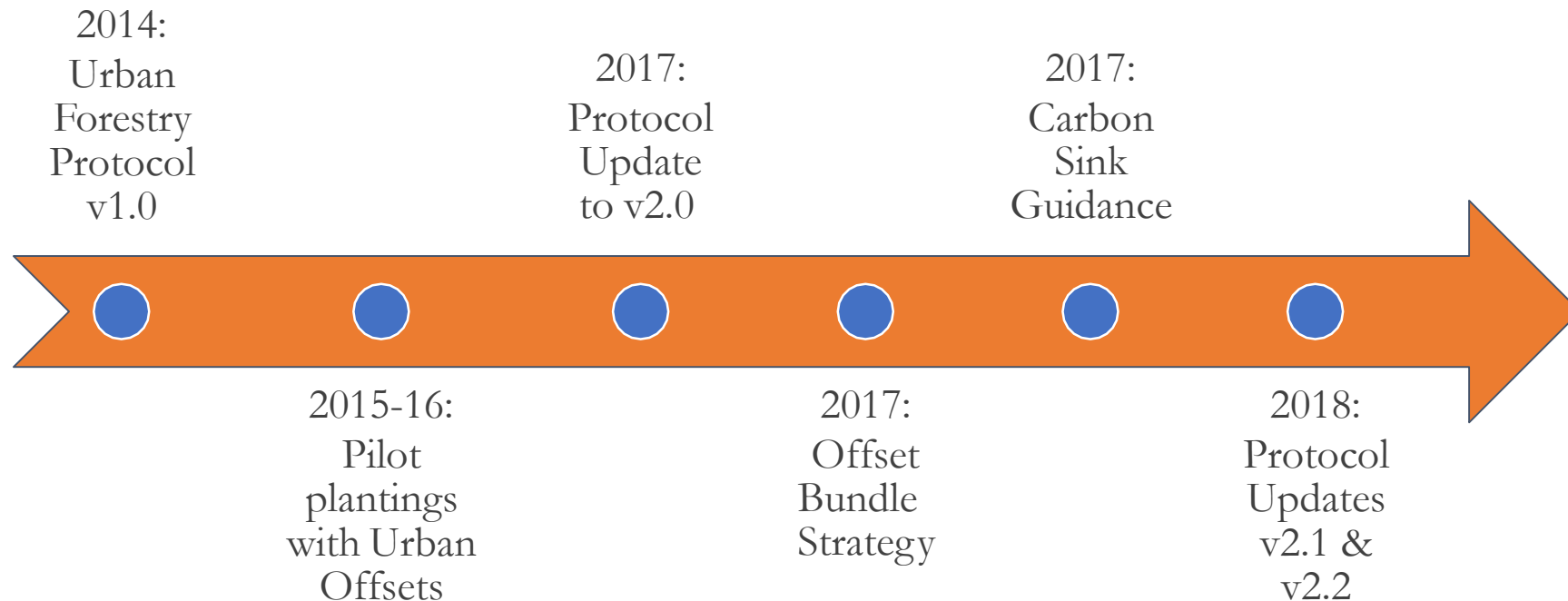
Project review and offset quantification must be documented and publicly available

Must meet **most** PAVER requirements

Must include transition document describing how project will meet all PAVER requirements in the future

Peer review institution will review project and confirm that most PAVER requirements met

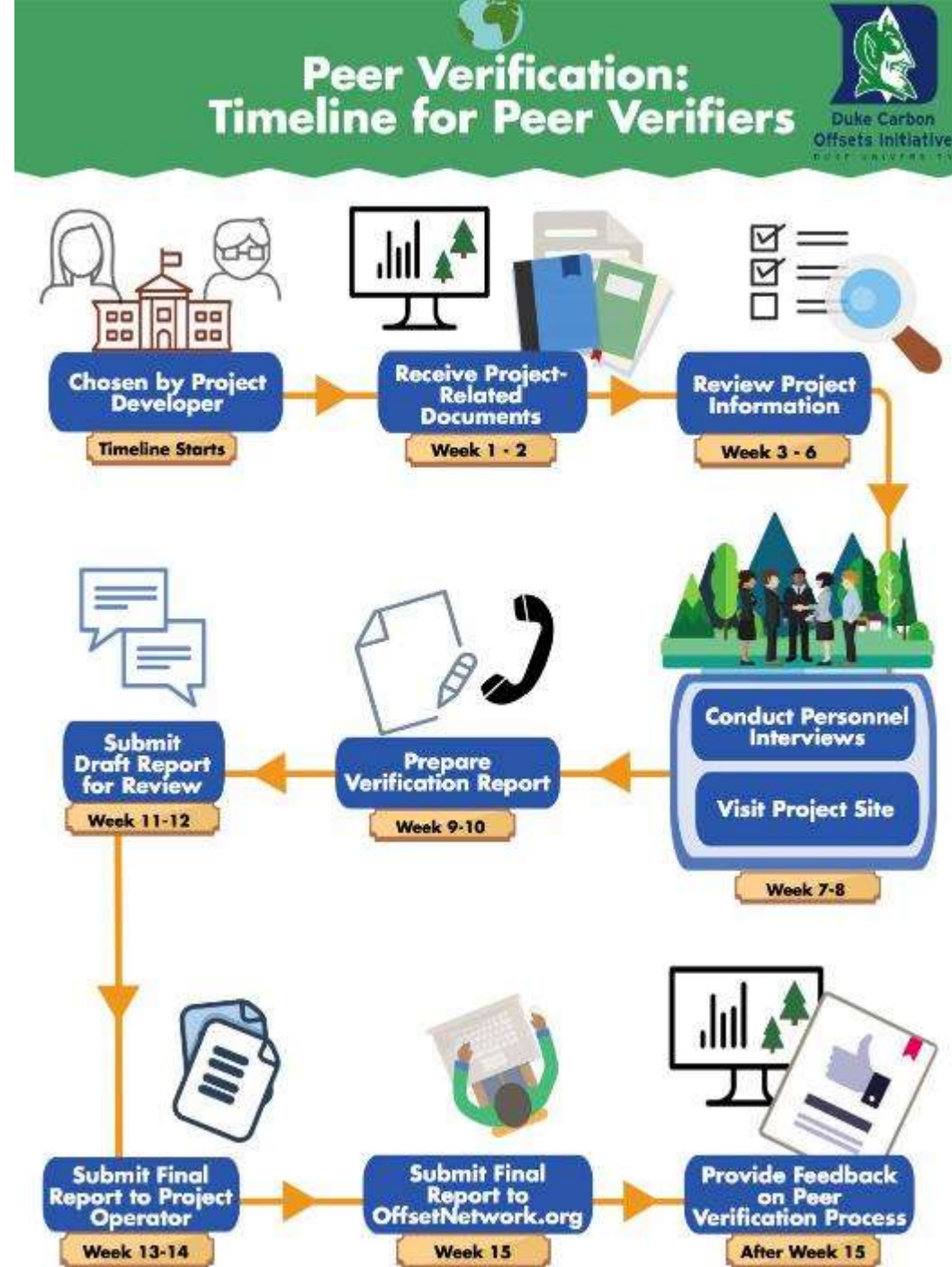
# Protocol & Guidance Doc Development



# Peer Verify through the Offset Network

Semester length project timeline allows for:

- Independent study
- Class group project
- Research opportunity

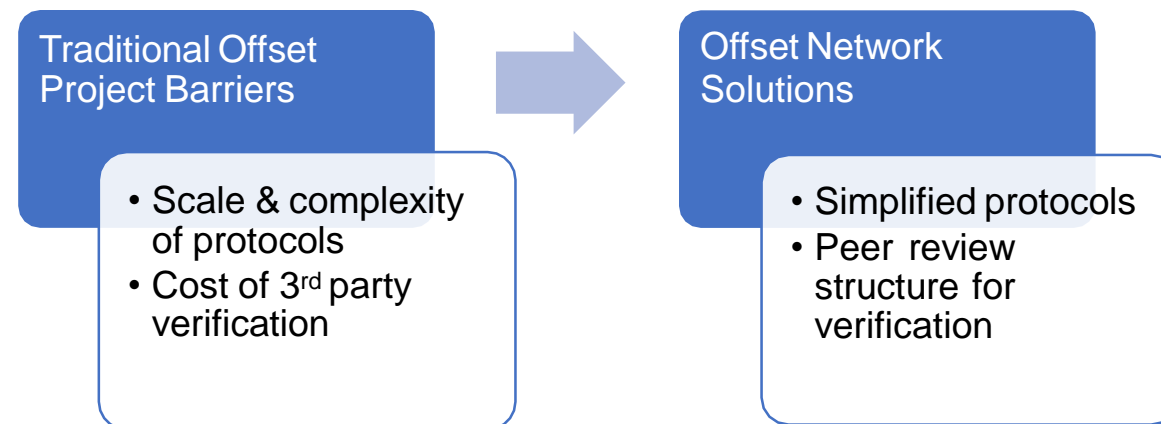


From presentation at AASHE Conference 2018: OffsetNetwork.org: Higher Ed's Hub for Self-Generated Offset Projects and Peer Verification, Tani Colbert-Sangree, Duke Carbon Offsets Initiative

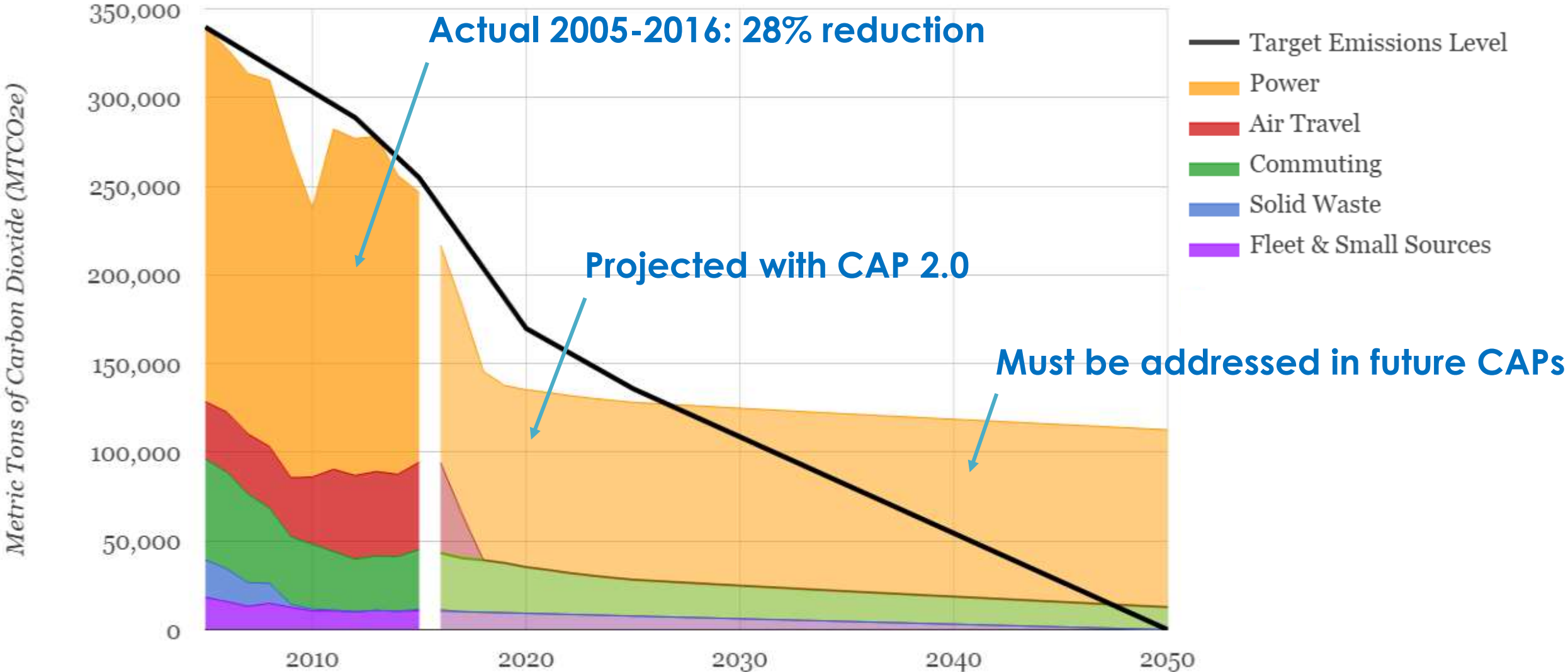
# Academia & Offset Markets

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- The role of higher education in offset markets
  - **Test-bed** or **Incubator**: foster innovative climate solutions & novel carbon offset projects
  - **R&D for the offset marketplace**: developing protocols & guidance materials for less known emission reduction opportunities
  - **Expand offset market**: chart path for scalable market adoption targeting protocols that have struggled to produce projects



# UMD's Greenhouse Gas Emissions: Past and Potential



# Timeline

- **2014** – President announced new Energy Initiatives to tackle energy consumption in campus buildings (and approved the use purchase of verified offsets to support carbon neutral new construction)
- **2015** – University Sustainability Council held Carbon Offset Work Group including major air travel stakeholders to study options and make recommendations
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# UMD: 2017 Carbon Offset Portfolio

## Protecting the Chesapeake Bay and Increasing Maryland's Resilience to Climate Change

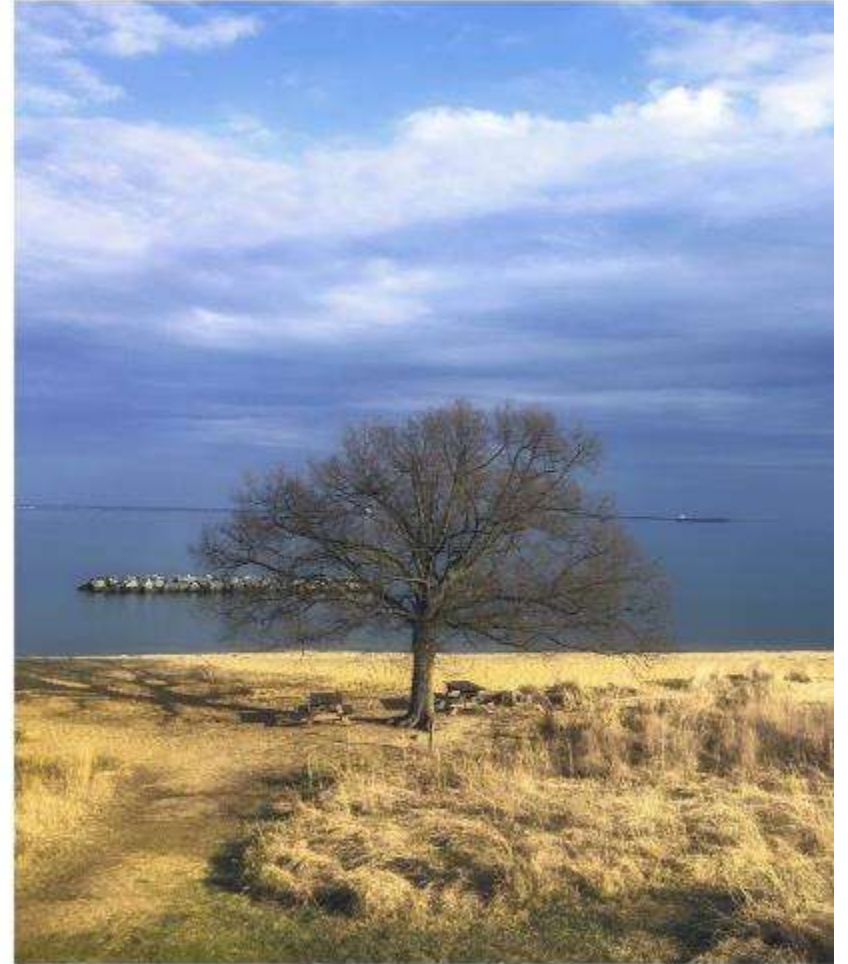
- Tree plantings throughout Maryland in partnership with the Chesapeake Bay Foundation
- Verified offsets from projects that capture methane emissions at regional landfills

## Student Involvement: Academic and Extracurricular

- Carbon Management class in School of Agriculture & Natural Resources worked with the Chesapeake Bay Foundation to quantify carbon sequestration at tree planting sites
- Alternative Breaks trip to Chesapeake Bay Foundation greenhouse to plant sycamore seedlings for use at tree planting sites

## Procurement Process: Keeping is Simple the First Time

- Investigated competitive bidding and researched potential suppliers
- Decided to go through an existing contract with a regional utility supplier to accommodate tight turnaround requirements, ensure successful messaging, and build our relationship with the Chesapeake Bay Foundation

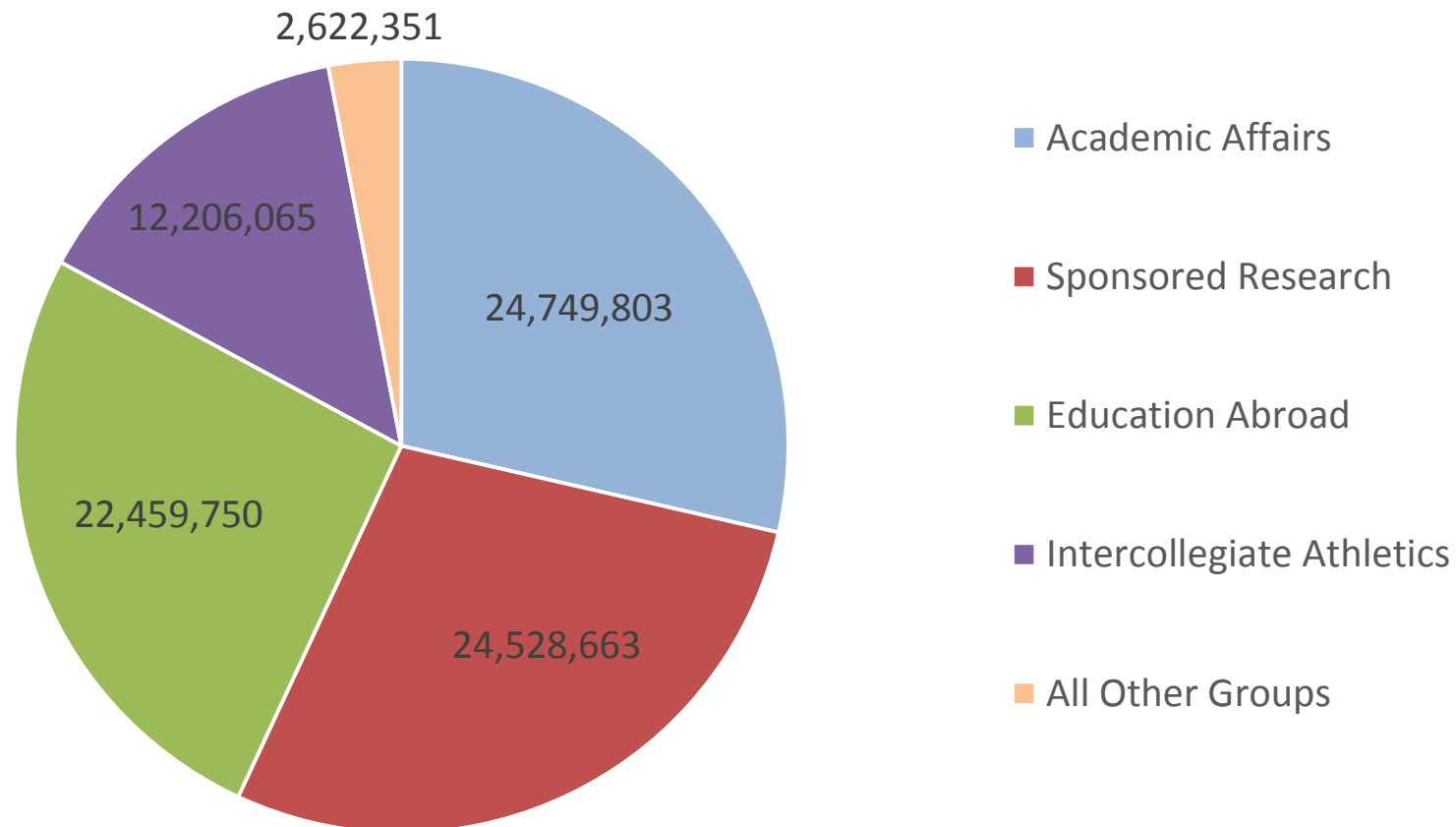




# Carbon Surcharge on Air Travel

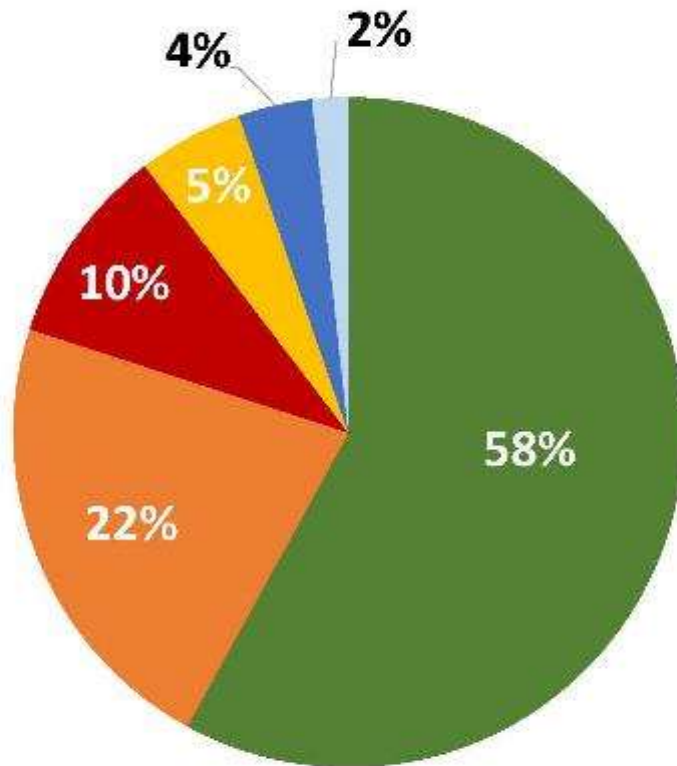
- Mandatory for all directly financed travel and all Education Abroad travel
- Provost covered bill for all research and academic travel in year one
- Funds go to the Greenhouse Gas Reduction Fund

**Passenger Miles for each Activity (CY 2016)**



# Carbon Surcharge on Air Travel

\$0.0027 per passenger mile (based on \$4.20/MTCO<sub>2</sub>e)



For **80%** of reported trips, the carbon surcharge would be **less than \$20**.

- less than \$10
- \$10-\$20
- \$20-\$30
- \$30-\$40
- \$40-\$50
- \$50-\$55

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terps leave **small** footprints

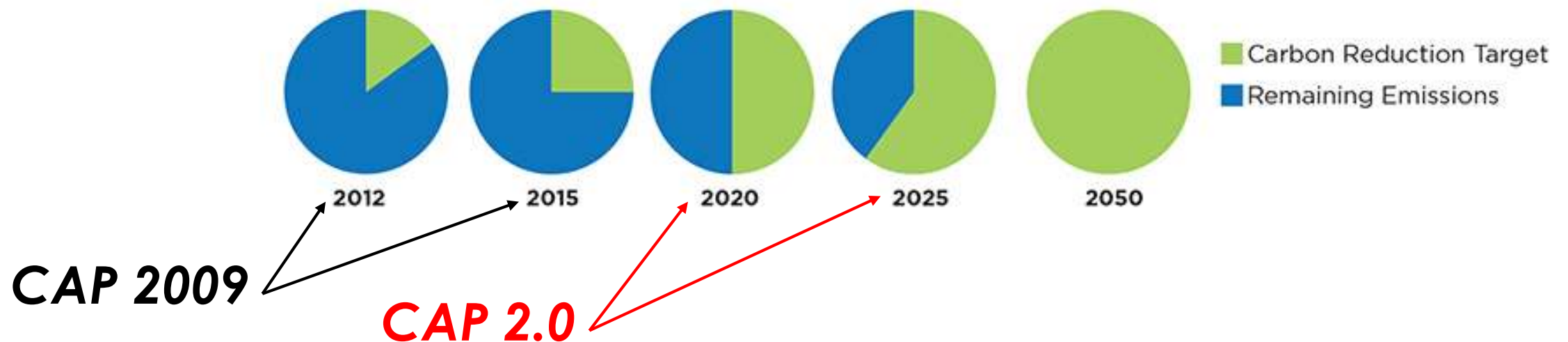
Sally DeLeon  
Senior Project Manager  
[sdeleon@umd.edu](mailto:sdeleon@umd.edu)  
301-405-4549

# Climate Action Plan (CAP) Targets

- **50% reduction in GHG emissions by 2020\***
- **60% reduction in GHG emissions by 2025\***
- **Carbon Neutral (net-zero GHG emissions) by 2050**

\* Scopes 1, 2 and 3 from 2005 baseline; Scope 3 includes air travel, commuting, and solid waste

## PLANNED EMISSIONS TRAJECTORY



# CarbonFootprint



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terps leave small footprints

